Image Details

Oil, Gas and Mineral Management

What We Do

Impacts on Wildlife Resources

Oil and gas exploration and production can cause both direct and indirect effects on refuge resources.

Checking an oil well at Delta National Wildlife Refuge in Louisiana. | Image Details

- **Leaks and spills** of oil, brine or other contaminants are a key concern. Soils, vegetation, water quality, fish and wildlife and air quality can all be harmed by the release of contaminants.
- **Fish and wildlife habitat** can be altered, fragmented or eliminated. Oil and gas activities can disturb and displace wildlife, cause physiological stress and can even result in wildlife deaths.
- **Introduction of invasive species** , especially along road and pipeline routes, can alter habitat. Disturbance caused by oil and gas activities can result in fundamental changes in ecological functions and processes, and lead to increased predation of declining species, reduced reproduction and increased susceptibility to disease.
- **Public use** of refuge areas may be restricted or prohibited. Although the areal extent of oil and gas exploration and production may be limited, the cumulative effects may extend to a much larger area.

The following resource issues are commonly associated with exploration, drilling and production operations.

Impacts from Exploration Operations

Access along seismic lines may require varying levels of vegetation removal.
Vehicle travel along seismic lines may damage soils and vegetation.
Water quality may be degraded from sedimentation.
Small spills and improperly handled wastes can degrade soils and waters, harm vegetation, fish and wildlife, air quality and aesthetics.
Air quality can be degraded from dust and engine emissions.
Natural sound is interrupted by vehicles and drilling noises.
Fish and wildlife may be injured or killed by human presence, vehicles, contaminant exposure, loss or degradation of habitat.
Cultural resources may be threatened.
Large crews may disrupt visitors' experiences.

Drilling and Production Impacts

Pad construction removes or compacts soil and vegetation, and poor construction may accelerate erosion and sedimentation.
Leaks, spills and discharges of oil, drilling muds, wastes or other contaminants can degrade and harm soils, surface and ground waters, vegetation, fish and wildlife, and air quality.
Poorly cased and cemented wells (or improperly plugged wells) may lead to groundwater contamination.
Wetlands may be damaged by road and pad construction or threatened by leaks and spills.
Formerly dark night skies can be illuminated by night-time lighting on drilling rigs and gas flares.
Air quality may be degraded by gas flaring, contaminant spills, and dust and engine emissions.
Natural sounds can be overwhelmed by construction and drilling noises.
Scenic quality can be degraded by drilling rigs, roads, pads and other equipment.

An abandoned oil well on refuge land. | Image Details

Fish and wildlife may be injured by human presence, vehicles, exposure to contaminants, loss or degradation of habitat, or unauthorized killing.
Cultural resources may be threatened by increased human accessibility and fire.

Exploration and Production

Exploration

Seismic surveys and exploratory drilling are the major activities that occur during exploration for oil and gas. Petroleum geologists use seismic surveys to locate oil and gas underground. **Seismic surveys** use reflected sound waves created by explosives or shock waves produced by vibroseis equipment to map subsurface geologic formations and potential petroleum reservoirs. Activities and impacts associated with drilling exploratory wells are similar to those for drilling production wells (see below).

Seismic surveys generally cover many square miles. Access roads may be constructed or existing roads upgraded to support exploration. The extensive nature of seismic surveys and access requirements make seismic exploration among the most potentially disruptive and damaging type of oil and gas activity.

Drilling

Most oil and gas wells are drilled with rotary drilling rigs that include a host of equipment, including the derrick or mast (the steel tower that supports the drill pipe and hoist system); mud tanks, and diesel engines and generators. The equipment is placed on a well pad that ranges from 4 to 6 acres and perhaps larger. Well completion can vary from 28 to 80 days, depending on the site and depth of the well. The average is 40 days.

After drilling the wellbore, the drilling rig and equipment are removed from the well pad and a decision is made on the ability of the well to economically produce oil and/or gas. If not viable, the well may be plugged and abandoned (see **Decommissioning/Reclamation** below).

If the well is economically viable, pipe or casing is installed and cement is pumped into the well to isolate it from aquifers and other geologic formations.

Horizontal wells drilled in shale oil or shale gas formations typically require fracturing the oil- or

gas-bearing rock by injecting large volumes of fluids (water, sand and chemicals) under very high pressure. Hydraulic fracturing (frack) operations use 2-5 million gallons of water per well. After the well is fracked, 10-70 percent of the fluid (flowback) is temporarily stored in either steel tanks (frack tanks) or an earthen pit (reserve pit). Flowback water is transported off site for disposal in injection wells or evaporation ponds.

Production

Following drilling and well completion, the well is brought into production. The wellhead is fitted with a series of valves, called a "Christmas tree." Most oil and gas wells will flow under natural formation pressure. However, over time, pressure decreases and requires installation of a pump. A pump jack is the most common pumping system used on oil wells.

Separators and storage tanks are used to process and store hydrocarbon liquids, crude oil, natural gas, and produced water or brine. Small diameter pipelines, or flow lines, transport the liquids and gases to separators and storage tanks designed to store 3-7 days of production. Liquids from the storage tanks are typically transported off site by tanker trucks.

Well maintenance is periodically conducted using a workover rig to repair mechanical problems or clean out the well. Workover rigs may be brought in for repairs anytime production experiences a problem. The rigs may be in place for only a few days to a few weeks, depending on the situation.

Decommissioning/Reclamation

The average life of a natural gas or oil well is 20-30 years, but the life an oil or gas field can be far longer. At Deep Fork National Wildlife Refuge in Oklahoma, the first well was drilled in 1901. Production continues throughout this area today.

Our Laws and Regulations

On November 10, 2016, the Service announced the final rule and record of decision. Both published in the Federal Register on November 14, 2016; the final rule became effective on December 14, 2016, when the regulations were updated.

Service regulations for management of oil and gas activities are contained at 50 CFR 29.31 and 29.32. These regulations had previously not been revised for more than 50 years. Service policy is outlined in the Service Manual Part 612.

Non-Federal Oil and Gas Rights: Non-federal oil and gas rights are privately owned. Individuals, corporations, nonprofit organizations, state or local governments, Indian tribes or native corporations may own these "non-federal" rights. The owners have the legal right to explore for and extract oil and gas from their mineral estate.

Service regulations state we shall protect refuge resources to the maximum extent possible without infringing on the rights of sub-surface mineral owners. The private mineral owner has a responsibility to show reasonable regard for the surface estate as required by state law.

Private mineral owners "*shall, to the greatest extent practicable, conduct all exploration, development, and production operations in such a manner as to prevent damage, erosion, pollution, or contamination to the lands, waters, facilities and vegetation of the area. So far as is practicable, such operations must also be conducted without interference with the operation of the refuge or disturbance to the wildlife thereon. Physical occupancy of the area must be kept to the minimum space compatible with the conduct of efficient mineral operations. Persons conducting mineral operations on refuge areas must comply with all applicable Federal and State laws and regulations for the protection of wildlife and the administration of the area. Oil field brine, slag, and all other waste and contaminating substances must be kept in the smallest practicable area, must be confined so as to prevent escape as a result of rains and high water or otherwise, and must be removed from the area as quickly as practicable in such a manner as to prevent contamination, pollution, damage, or injury to the lands, waters, facilities, or vegetation of the refuge or to wildlife. Structures and equipment must be removed from the area when the need for them has ended. Upon the cessation of operations the area shall be restored as nearly as possible to its condition prior to the commencement of operations.*" (50 CFR 29.32)

Federal Oil and Gas: Federally owned oil and gas resources under National Wildlife Refuge System lands are administered by the Bureau of Land Management (BLM) in consultation with the

U.S. Fish and Wildlife Service. Under the Mineral Leasing Act of 1920 and the Reform Act of 1987, BLM has regulatory authority to offer and administer all oil and gas leases on onshore federal lands. However, BLM regulations dictate that new leases on refuges are approved only in cases where wells on neighboring lands are draining and capturing federally-owned oil and gas without compensating the federal government. Regulations governing the BLM's oil and gas leasing program are in 43 CFR 3000 and 3100.